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ABSTRACT

This publication outlines a set of competencies for all public school educators and is designed to guide the development of computer study based on specific objectives. The order for teaching the competencies is left to the discretion of the inservice or preservice teacher, and they may be taught in independent courses or incorporated into existing courses. Focus is on the teacher's educational role rather than administrative applications. It is noted that the individual competencies included, while stated briefly, may require weeks or months of time-on-task to acquire. A rationale and specific objectives are listed for the following topics: educational applications, implementation, attitudes, software, programming, hardware, computers in society, general applications, information resources, and future trends. An appendix lists five references. (LMM)

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Essential COMPUTER COMPETENCIES for Educators

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FOREWORD

The growing use of information technology is creating new opportunities and challenges for education. The computer in particular seems ideally suited to help meet our schools' academic and vocational goals.

Therefore, acquisition of a basic set of computer competencies, such as is presented in this publication, is of increasing importance to educators in Texas public schools.

We hope this publication will assist teachers of inservice and preservice to develop programs that will allow all Texas educators to obtain this core of knowledge, skills, and attitudes about computer technology.

Raymon L. Bynum
Commissioner of Education

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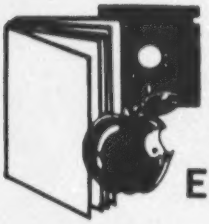
INTRODUCTION

This publication outlines a set of competencies all public school educators should acquire. It is designed to guide the development of computer study based on specific objectives.

The order in which the competencies are to be taught is left to the discretion of the inservice or preservice teacher. The competencies may be taught in independent courses, or they may be incorporated into existing courses. Other decisions to be made concern performance criteria, learning experiences, methodology, and time-on-task.

Programs for developing the competencies should be designed in consideration of the learners' responsibilities. To provide a relevant teaching model, computer-based instruction and instruction using other technology should be used as appropriate. The competencies presented focus on the teacher's educational role rather than on the administrative role of education. While the competencies are stated briefly, they will often require weeks or months of time-on-task to acquire. Therefore, the educator should be prepared for intense learning experiences beyond the levels of awareness and simple acquisition of information. During training, frequent hands-on experience is important. Individuals should have access to appropriate equipment and programs while acquiring the skills.

Computer competencies introduce educators to a wide range of information technologies. With these competencies, public school educators can become participants in the excitement and challenge of the information age. However, like all modern electronic technology, computers keep changing. Thus the competencies presented are not an ultimate end. They are intended as a rootstock for a tree that will grow many specialties and specialists.



EDUCATIONAL APPLICATIONS

RATIONALE

Computers are powerful tools that may free teachers from unproductive routines, offer more individualized instruction, and aid student productivity and creativity. Such potential may become a reality as educators become aware of practical applications of computers. Indeed, computers will be accepted in education when teachers learn to use them successfully in the daily routine of teaching.

What educators learn about computers should be useful and transferable so that educators themselves will lead the way in creating new applications to teaching.

COMPETENCIES

To use computers for instructional purposes, educators should be able to:

a. characterize the use of the computer as an object of instruction, as an instructional medium, and as a problem-solving tool

b. identify various options for using computers in an instructional setting for teaching and classroom management, such as:

- computer assisted instruction (CAI)
- computer managed instruction (CMI)
- problem solving
- test scoring
- word processing
- materials generation and management
- data-base management

c. differentiate between instructional computer applications such as drill-and-practice, tutorial, simulation, and problem solving

d. apply and evaluate the general capabilities of the computer as a tool for instruction

e. use computer courseware to individualize instruction and increase student learning

IMPLEMENTATION

RATIONALE

Implementing computer-based instruction requires competency beyond knowledge of the computer and its software. For example, computer use often changes the structure of the instructional period. Sometimes it affects where instruction takes place, content, and how instruction is delivered. Computer implementation places demands for careful, new, and creative approaches on the educator. Planning and practice should be based on knowledge of the capabilities and limitations of the technology, as well as sound pedagogy.

Access, availability of resources, and prepared personnel are only a few of many considerations involved as educational institutions begin to use more technology in teaching. (A document entitled "Guide for Selecting a Computer-Based Instructional System" developed by the Texas Education Agency may be helpful.)

COMPETENCIES

To plan and execute activities to help ensure appropriate and successful uses of computers in instruction, educators should be able to:

a. discuss the effects of computer use on student learning, based on current research findings

b. describe unique characteristics of computers that can facilitate learning (for example, non-threatening feedback, learner control, adaptability, and accessibility)

c. describe a computer-based instructional system as a group of components including software, documentation, hardware, facilities, training, management, and evaluation procedures

d. plan for methods to integrate computer awareness and literacy into the existing curriculum

e. define the elements of a district plan for computer-based instruction, and define the role of the individual instructor in supporting that plan

f. assist in the selection, acquisition, and use of computers in an instructional program

g. demonstrate appropriate uses of computer technology for basic skills instruction

h. plan for effective pre- and post-computer interaction activities for students, (for example, de-briefing after a science simulation)

i. plan for appropriate scheduling of student activities involving use of the computer

j. describe appropriate instructional arrangements for computer-based learning experiences (for example, physical arrangements and groupings)

k. demonstrate ways to integrate the use of computer-related materials with non-computer materials, including textbooks

j. describe possible effects that computer uses in instruction might have on the existing structure of schools

ATTITUDES

RATIONALE

Educators' attitudes about computer technology will be reflected in their teaching both with and about the technology. They will develop their attitudes based on whether or not they have positive experiences when learning about computers.

Measurement of attitudes may be difficult, yet it is essential that positive attitudes be developed if educators are to be computer competent.

COMPETENCIES

To reflect positive attitudes about computer technology, educators should:

a. be free of fear, anxiety, and intimidation from computer-based experiences

b. display satisfaction and confidence about their ability to use and control computers

c. value the benefits of computerization in education and society for such contributions as:

- efficient and effective information processing
- automation of routine tasks
- increasing communication and availability of information
- improving student attitude and productivity
- improving instructional opportunities

d. choose to spend some free time using a computer

SOFTWARE

RATIONALE

The quality and availability of software are critical to the use of the computer. Educators must know the importance of software, where and how to obtain it, and be able to evaluate and assess it. Courseware development should be systematic and pedagogically sound. Since most software is produced commercially, the school user must be a competent consumer. The educator should be able to specify school needs for software, to communicate those needs to the commercial sector, to analyze software in relation to curriculum goals and student objectives, and to make decisions about its appropriateness for the task at hand.

COMPETENCIES

To select and use appropriate software, educators should be able to:

a. recognize that a computer gets instructions from software written in a programming language

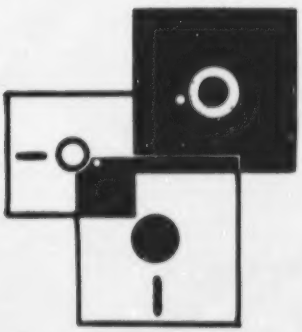
b. use at least one quality evaluative process to appraise and determine the instructional worth of a variety of computer software

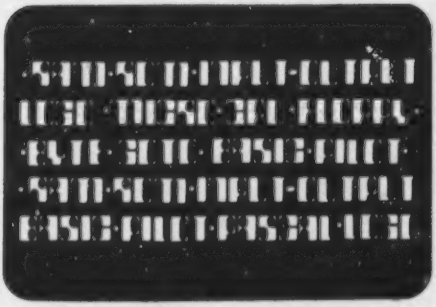
c. locate and use a variety of sources of evaluative information about software

d. load and run a variety of computer software packages

e. respond appropriately to common error messages when using software

f. make authorized copies of computer software





PROGRAMMING

RATIONALE

Knowing how to program is fundamental to communicating with and controlling the computer. The power of computer technology is directly related to human ingenuity in programming. The focus for programming competencies should be on familiarity with simple procedures in at least one high-level language such as BASIC, Pascal, or Logo. While all teachers need not become expert programmers, an understanding of technique, including syntax and application, is important. This familiarity should include authoring systems and awareness of the complexities of designing effective instructional software.

COMPETENCIES

To adequately cause computers to do basic tasks appropriate to teaching, educators should:

a. recognize that problem solving involves a series of logical steps and that programming is translating those steps into instructions for the computer

b. demonstrate an awareness of computer systems such as authoring languages and utility programs used for the development of computer-based curriculum materials

c. use a high-level language such as BASIC, Pascal, Logo, or Pilot to read and write simple programs that work correctly

d. exhibit the ability to make simple programming modifications of computer software when possible and desirable

HARDWARE

RATIONALE

In the coming decades, increased instructional dollars probably will be spent for hardware, both to improve productivity of schooling and to provide relevant education to students. Familiarity with computer devices is necessary for educators who will use the tools effectively.

COMPETENCIES

To properly use computer devices in teaching, educators should be able to:

a. use various diagnostic strategies to ascertain the cause of a malfunction and to determine if the problem is related to hardware or software

b. assemble or connect computer systems typically used in instructional situations

c. identify, describe, and demonstrate the function and operation of various components of computers and related peripheral devices (for example, keyboards, printers, modems, graphics tablets, etc.)

d. evaluate various hardware configurations that might be used in instructional applications, based on software availability and instructional requirements

COMPUTERS IN SOCIETY

RATIONALE

Schools have a responsibility to prepare students to function in a highly technical, rapidly changing society. The proliferation of computer applications raises a number of issues which teachers must be prepared to discuss with students.

COMPETENCIES

To teach about a variety of positive and negative societal influences that computer technology may have on people, educators should be able to:

a. describe the impact that technological developments have on various career options

b. demonstrate an awareness of computer usage in fields such as

- health
- law enforcement
- education
- business and industry
- transportation
- communications
- military

c. discuss some of the positive and negative consequences of computer use in today's society, for example,

- machine dependence vs. machine independence
- de-personalization vs. personalization
- increase vs. decrease in job availability

d. discuss irresponsible behaviors that may be associated with computer technology such as computer crimes, violation of copyright laws, and unauthorized use of information

e. discuss issues regarding equity of access to computer resources

f. use and teach the unique nomenclature of computing to facilitate communications and continued learning in order to incorporate technology as a part of the language of education

GENERAL APPLICATIONS

RATIONALE

Educators are expected to prepare citizens for life and to some extent for livelihood. Therefore, educators must be prepared to teach about the technologies pervading society. They must know enough about computer uses in business, industry, leisure, home life, and education to communicate effectively with parents, students and other persons.

COMPETENCIES

To teach about how computers work and how they are used, educators should be able to:

a. explain various applications of computer technology for business, industry, leisure, and home management

b. list some of the limiting considerations for using computers, such as cost, software availability, and hardware limitations

c. list some of the characteristics that enable computers to be effective at information processing tasks that require speed, accuracy, and repetition

d. demonstrate an awareness of the different programming languages suitable for science, business, industrial, and educational applications

e. demonstrate an awareness of the major types of applications of the computer such as information storage and retrieval, simulation and modeling, process control and decision making, computation, and data processing

f. describe how computers can assist the individual

g. describe ways computers can assist in decision making

h. communicate effectively about computers by understanding and using appropriate terminology

INFORMATION RESOURCES

RATIONALE

Educators should regularly learn about new instructional uses of computers. Competent educators expand their knowledge by using information resources relevant to public school programs. Typical resources are:

- libraries
- training sessions or courses offered by colleges and universities, school districts, education service centers, and businesses
- software directories
- journals, books, and audiovisual materials on computers in instruction
- on-line information bases
- professional organizations and conferences dealing with technology uses in instruction
- state and federal agency publications

COMPETENCIES

To locate and use information about computer technology relevant to instructional activities, educators should be able to:

a. describe what producers of instructional materials are doing to integrate computers with other electronic and print media

b. identify and use a variety of sources of current information about computing as it relates to education

c. evaluate and assess information regarding computer uses in education, and use that information to plan for appropriate instructional uses

FUTURE TRENDS

RATIONALE

Rapid developments in computer and other technologies will continue to greatly affect education. The combining of multiple electronic technologies is expected to increase use of telecommunications networks, interactive video, synthesis of voice and music, robotics, and access to information bases. Developments in computer interfacing, aritificial intelligence, programming languages and software will also make their impact on school programs, and people.

The school professional will need an appreciation of the powerful possiblities and capabilities of the technology, along with an attitude that accepts rapid change and challenges.

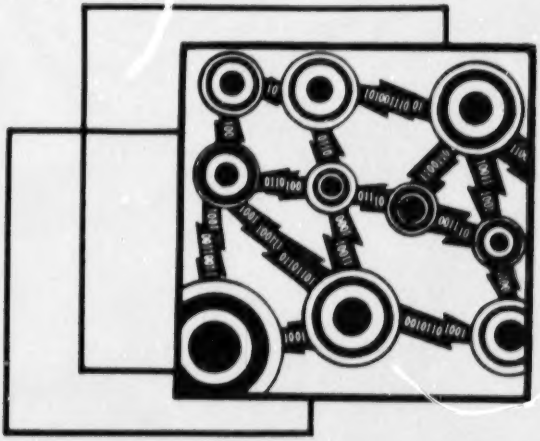
COMPETENCIES

To make intelligent decisions about projected uses of technology in education, educators should be able to:

a. summarize future projections and trends in computer technology

b. demonstrate an awareness of state-of-the-art developments in technology and their potential applications to education

c. respond appropriately to changes in curriculum and teaching methodology caused by new technological developments



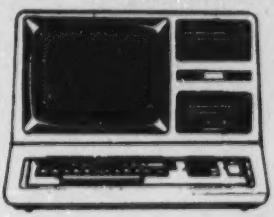
·BYTE·RAM·ROM·INPUT·OUTPUT

·LOGO ·MICRO·CPU·FLOPPY

GOTO· BASIC·PILOT·PASCAL

·MICRO·CPU·FLOPPY

·PILOT·PASCAL·LOGO



APPENDIX

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COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;
(2) operation of school bus routes or runs on a non-segregated basis;
(3) nondiscrimination in extracurricular activities and the use of school facilities;
(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;
(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;
(6) nondiscriminatory practices relating to the use of a student's first language; and
(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights Act is found, the findings are reported to the Office for Civil Rights, Department of Health, Education and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiation, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964; EXECUTIVE ORDERS 11246 AND 11375; TITLE IX, 1973 EDUCATION AMENDMENTS; REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; AND VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

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